

Vision 21

The NASA Strategic Plan



January 1992

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“NASA exists to inspire and better the lives of all Americans, young and old, through our achievements as the world leader in space exploration and aeronautics research.”

— NASA Administrator Richard H. Truly

Message from the Administrator to the NASA Team

As we lay the foundation for the civil space program of the twenty-first century, I believe it is essential for all members of the NASA Team to fully understand our vision in this decade and beyond. For the past few years, the National Space Council, under the leadership of Vice President Quayle, has addressed the principal issues facing the civil space program, and NASA has been a key participant in this assessment. **Vision 21**, the NASA Strategic Plan, is our roadmap to the future, the NASA plan for ensuring United States leadership in space exploration and aeronautics research. **Vision 21** is fully consistent with National Space Policy, the recommendations of the Advisory Committee on the Future of the U.S. Space Program, as well as National Space Council and Congressional guidance and directives.

Vision 21 is based on my conviction that NASA exists to make the United States the world leader in space exploration and aeronautics research and, through our achievements, to inspire and better the lives of all Americans. **Vision 21** foresees a series of programs and accomplishments that the people of the United States can esteem, admire and treasure -- programs that look outward to the stars and planets and inward toward the planet Earth. It also envisions the type of agency we will be -- how we will manage ourselves and our resources. In that regard, I believe there is an overarching management responsibility to actively support and nurture mathematics, science, and technology education. NASA is uniquely positioned to further this critical national goal, and we must take the initiative.

The NASA Strategic Plan, Vision 21, is a leadership plan. To implement the ambitious plan outlined in **Vision 21**, it will take the hard work, dedication, innovation, and commitment of the entire NASA Team -- the same ingredients that have made the United States the world leader in space exploration and aeronautics research for the last 30 years. As we pursue our goals, we will adhere to a set of strong values and principles.

I believe the decade of the nineties offers NASA new opportunities and challenges. However, to be assured of opportunities in the future, we must be successful today. With your continued support and commitment, we will fulfill the goals that are outlined in **Vision 21** and we will chart new frontiers in space. As President Bush so eloquently said, "In decades ahead, . . . we will travel to neighboring stars, to new worlds, to discover the unknown. It will not happen in my lifetime. . . but a dream to be realized by future generations must begin with this generation."


Richard H. Truly

January 1992

NASA's Values and Principles

These are the values and principles shared by all the men and women of the NASA Team . . .

Public Trust

Earning and keeping the trust and confidence of our ultimate customer -- the American taxpayer.

Integrity

Holding ourselves fully accountable for our actions and being honest and ethical in all our dealings.

Achievement of Goals

Attaining success in the face of risk and the great unknowns of space exploration.

Continuous Improvement

Committing ourselves to the ongoing pursuit of excellence and quality in all efforts.

Respect for the Individual

Encouraging teamwork through mutual respect and open communications.

Work Force Diversity

Emphasizing cultural, racial, ethnic, and gender diversity among our highly skilled team.

Safety and Reliability

Advancing safety and reliability, while recognizing the risks inherent in many of our pursuits.

Respect for the Environment

Conducting our daily business with high regard for the health and future of our home planet.

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"A fundamental objective guiding United States space activities has been, and continues to be, space leadership."

— George Bush

Introduction

In 1958, the National Aeronautics and Space Administration was established by Congress to "plan, direct and conduct aeronautical and space activities" devoted to "peaceful purposes for the benefit of all mankind," activities that were recognized to be in the interest of the nation's security and general welfare.

For over 30 years, the NASA Team has responded to this challenge and has captured the imagination of the world. Projects such as Mercury, Gemini, Saturn V, Apollo, Mariner, Viking, Skylab, Apollo-Soyuz, Voyager, Explorer, Magellan, Galileo, Space Shuttle, Spacelab and the Great Observatories have expanded our understanding of the universe, have improved our quality of life, and have helped humankind slip the bonds of Earth.

This NASA Strategic Plan, **Vision 21**, is a living roadmap to the future to guide the men and women of the NASA Team as they ensure United States leadership in space exploration and aeronautics research. This multiyear plan consists of a set of programs and activities that will retain our leadership in space science and the exploration of the solar system; help rebuild our nation's technology base and strengthen our leadership in aviation and other key industries; encourage commercial applications of space technology; use the unique perspective of space to better understand our home planet; provide the U.S. and its partners with a permanent space-based research facility; expand on the legacy of Apollo and initiate precursor activities to establish a lunar base; and allow us to journey into tomorrow . . . journey to another planet -- Mars -- and beyond.

Whereas in the past, the space program primarily looked outward, today's space program looks inward as well in order to better understand our fragile planet. Whereas in the past, the space program was a symbol of the superpower race for technological dominance, today's space program represents common pursuits by all nations of the world to improve the quality of life for all humankind. And finally, whereas the space program of the past was the responsibility of governments, the space program of today and tomorrow represents the combined efforts of the government and the private sector to fulfill the fundamental goals of the civil space program and to capture new markets and economic opportunities.

Much has changed since the advent of NASA and the civil space program in 1958, but three things have not: (1) leadership in space is still a critical element of the nation's security, scientific, technical, economic, education and foreign policy goals; (2) the men and women of the NASA Team remain committed to excellence and innovation in implementing a balanced and diversified civil space program; and (3) the United States has, without question, the best space program in the world.

In this environment, NASA has formulated **Vision 21**, the strategy for implementation of the objectives outlined in the National Space Policy endorsed by the President, the Vice President and the National Space Council, as well as the objectives enunciated in the agency's authorization and appropriations acts.

*"Until one is committed, there is
hesitancy, the chance to draw back,
always ineffectiveness. . .the moment one
definitely commits oneself, then
providence moves too. So whatever you do
or dream you can, begin it. Boldness has
genius, power and magic in it."*

— Goethe

Vision and Goals

NASA's Vision 21 envisions an aeronautics and space program that inspires and better the lives of all Americans, young and old, through our achievements as the world leader in space exploration and aeronautics research. The sight of our nation's best and brightest pushing back the vast unknowns of space will be a source of inspiration and pride for the American people. The peaceful exploration of space will demonstrate American leadership, technical excellence, and the national commitment to innovation. The successful transfer and insertion of technology breakthroughs into the private sector by NASA will enhance American competitiveness and improve the quality of life. Data from space will help us understand how to protect the Earth's fragile environment. Space exploration will capture the imagination of America's youth and stimulate their interest in math and science. And a rush of new discoveries will enable a many-fold expansion of human knowledge, a true measure of a great society.

NASA will be regarded as a pacesetter among government institutions and industry alike, the standard for project management and execution. The agency will lead the way in management innovations and in productive relationships with academia and the private sector. The NASA work force will be culturally diverse, recognized for its expertise, the symbol of teamwork and accomplishment. The agency's forward-looking programs will define the cutting edge of technology, and the NASA Team will be the hallmark of safety, quality and reliability.

The NASA of the future will not rest on its laurels, nor will it shrink from attempting the dangerous and difficult. Its torch will be kept burning by its most precious asset -- the young men and women drawn to NASA by its bold and shining vision.

To fulfill its vision, NASA will pursue the following goals:

To advance scientific knowledge of the planet Earth, the sun, the solar system, the universe and fundamental physical and biological processes;

To expand human activity beyond Earth orbit into the solar system;

To strengthen the competitive posture of the United States in the fields of space and aeronautics; and

To attract young people to the wonders of mathematics, science and technology and ensure a more technically literate society equipped for the world of tomorrow.

To achieve these goals, NASA depends on broad public and political support, and the agency will strive to earn this support. NASA also will demonstrate the value and relationship of the space program to our economic, political and educational systems. The agency will conduct its affairs with honesty and openness; emphasize our vision, goals, and missions; and use a wide range of communications tools and technology to inform the American public about our accomplishments and the important benefits they provide our nation.

Vision 21 is a strategic plan that carefully balances the goals of the civil space program. It is a plan that will ensure United States leadership in space exploration and aeronautics research and will add to the roster of accomplishments and benefits ascribed to NASA.

Vision 21

The NASA Strategic Plan

NASA's **Vision 21** envisions an aeronautics and space program that inspires and better the lives of all Americans, young and old, through our achievements as the world leader in space exploration and aeronautics.

GOALS

- *Advance scientific knowledge of the planet Earth, the sun, the solar system, the universe, and fundamental physical and biological processes;*
- *Expand human activity beyond Earth orbit into the solar system;*
- *Strengthen the competitive posture of the United States in the fields of space and aeronautics; and*
- *Attract young people to the wonders of mathematics, science and technology and ensure a more technically literate society equipped for the world of tomorrow.*

MISSIONS

- *Space Science*
- *Mission from Planet Earth*
- *Mission to Planet Earth*
- *Aeronautics Research*

ENABLING CAPABILITIES

- *Human Resources*
- *Physical Resources*
- *Space Technology Research*
- *Space Station Freedom*
- *Space Transportation and Communications Systems*

"Concern for man himself and his fate must always form the chief interest of all technical endeavors. . . . Never forget this in the midst of your diagrams and equations."

— Albert Einstein

Missions and Enabling Capabilities

To implement its goals, NASA has identified its primary missions and critical enabling capabilities. This framework is consistent with the findings and recommendations of United States National Space Policy, Congressional directives and guidelines, and the 1990 Report of the Advisory Committee on the Future of the U.S. Space Program. At the outset, it should be noted that an important portion of the current and planned NASA budget is devoted to providing these enabling capabilities since they are the foundation upon which mission success lies.

The primary missions of NASA are:

Space Science - the pursuit of basic discovery and understanding;

Mission to Planet Earth - the use of the unique perspective of space to understand our home planet and the phenomena of global change;

Mission from Planet Earth - the exploration of space and the expansion of human presence and activity beyond Earth orbit into the solar system; and

Aeronautics Research - vehicular technology and disciplinary research to sustain United States leadership in the increasingly competitive field of aviation.

The linchpins enabling the success of these missions are the NASA enabling capabilities:

Human Resources - NASA's well-educated, highly skilled, experienced, culturally diverse, extremely motivated men and women in the civil service, aerospace industry and university work force -- our most important resource.

Physical Resources - NASA's cutting-edge test facilities, launch pads, wind tunnels, computational centers, aircraft, research laboratories, management systems and equipment.

Space Technology - the development and transfer of advanced technology, bridging the gap between concept and application in manned and robotic missions, and the active transfer of these technologies to industrial and commercial applications.

Space Station Freedom - the development of a permanently manned outpost in space where we will learn to live and work productively, build and operate large systems, and conduct advanced research to benefit all mankind.

Space Transportation and Communications - the provision of high-confidence, reasonable-risk, manned and unmanned launch services, plus an effective and efficient command, control, and communications infrastructure.

"Science offers a largely unexplored hinterland for the pioneer who has the tools for the task. The rewards of such exploration both for the nation and the individual are great."

— Vannevar Bush

Mission - Space Science

The NASA Space Science Mission will use the unique aspects of space to advance the scientific study of the universe, to solve practical problems on Earth, and to provide the scientific foundation for expanding human presence in space.

During the next decade, NASA will conduct an unparalleled program in space science. Spacecraft will examine the planet Venus, observe the wonders of Mars, probe the mysteries of Jupiter and Saturn, and provide us with our first-ever glimpse at the polar regions and interior of the sun. NASA also will develop an innovative series of small and intermediate-scale planetary spacecraft and continue its plans to conduct a balanced program of solar system exploration. NASA's robotic missions will provide the scientific and technological foundation for the ultimate planetary mission -- a manned mission to Mars. Included in the approved planned planetary program are "flagship" missions such as Galileo and Cassini, and intermediate missions such as the Mars Observer. Other missions such as the Mars Environmental Survey and small spacecraft in the Discovery program are being assessed for inclusion in future budgets. (The term "flagship" missions denotes more capable long-duration missions that should push back scientific frontiers, serve the broadest possible scientific community, and secure scientific leadership.)

Meanwhile, NASA's Great Observatories, Hubble Space Telescope and Compton Observatory, will continue to explore the **fundamental mysteries of the near and distant universe**. These spacecraft will be joined later in the decade by the Advanced X-ray Astrophysics Facility (AXAF) and, if feasible, by the Space Infrared Telescope Facility (SIRTF). Plans are being formulated for these "flagship" astrophysics missions to be complemented by potential flights of Explorer spacecraft and new small and intermediate-scale missions in space physics and space astronomy. A broad array of Spacelab missions also is planned and will expand our understanding of the universe and provide the scientific foundation for basic and applied life sciences and microgravity research activities on Space Station Freedom. The decade of the nineties will be an era marked by major scientific progress and continued United States leadership in space science research.

NASA's space science program will continue to pursue answers to the most fundamental questions about the **origins and future of the universe**. The key elements of the space science program include:

Completing the development of the **"Great Observatories,"** which will allow us to observe the universe with unparalleled sensitivity and resolution across the electromagnetic spectrum;

Completing our survey and detailed characterization of the **solar system**, including the terrestrial planets, asteroids and comets, and the planets of the outer solar system;

Enhancing our understanding of the complex physical behavior and variability of the **sun**, and its effects on the Earth and other solar system bodies; and

Using the unique attributes of Spacelab and Space Station Freedom to accomplish our **goals in microgravity research and life sciences by facilitating fundamental advances in materials science, fluid physics, biotechnology, gravitational biology, biomedical research and long-duration human space flight.**

As was noted by the Advisory Committee on the Future of the U.S. Space Program, NASA's space science activity is the fulcrum of the entire civil space effort:

It is this endeavor in science that enables basic discovery and understanding, that uncovers the fundamental knowledge of our planet to improve the quality of life for all people on Earth, and that stimulates the education of the scientists needed for the future. Science gives vision, imagination and direction to the space program. . . .

In conducting its space science programs, NASA is committed to taking the lead in fostering mutually beneficial cooperative missions with the spacefaring and non-spacefaring nations of the world. This is consistent with National Space Policy; it enhances NASA programs; and allows us to share worldwide the benefits of space science and applications research. This research is conducted pursuant to a strategic plan formulated by NASA with important inputs from the science community.

The strategy for space science seeks to preserve highest priority for completion of the program now under way and approved by the President and Congress, and then to provide new resources for the initiation (in priority order) of (1) small missions to ensure frequent access to space; (2) intermediate missions to provide disciplinary balance and continuity; (3) flagship missions to secure scientific leadership; and (4) enhancements to the research and technology base to improve current and future program vitality.

The principal programmatic elements of the NASA space science program over the next decade are depicted in Figure 1.

SPACE SCIENCE STRATEGY

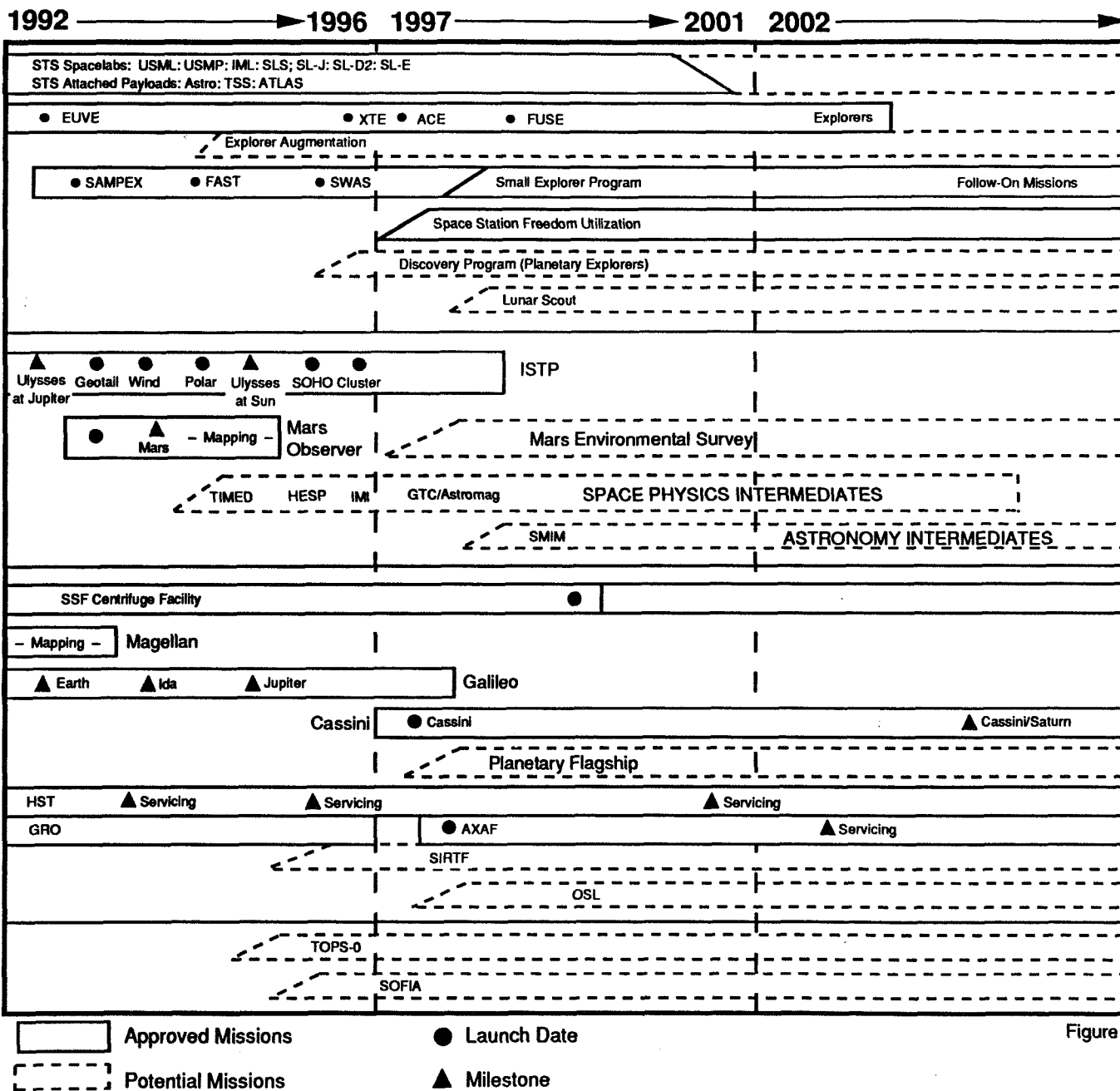


Figure 1

"To see the Earth as we now see it, small and blue and beautiful in that eternal silence where it floats, is to see ourselves as riders on the Earth together. . . brothers who see they are now truly brothers."

— Archibald MacLeish

Mission To Planet Earth

NASA's Mission to Planet Earth is a Presidential initiative and represents the agency's contribution to the U.S. Global Change Research Program and to related international efforts to better understand our planet Earth and how humans may be affecting it. Mission to Planet Earth builds on earlier missions to study the Earth's global ozone changes, atmospheric dynamics and ocean circulation. The recently restructured program reflects the recommendations of the Earth Observing System Engineering Review Panel and the Payload Advisory Panel, as well as the guidance of the Appropriations Committees. It consists of instruments and spacecraft to be launched during the 1990s and beyond, and a vigorous science and analysis program, including a state-of-the-art data and information system. The mission is coordinated with space-based and ground-based research conducted by other federal agencies, as well as the space-based and ground-based research being conducted by other nations.

The strategy for Mission to Planet Earth consists of several interrelated elements, each of which builds on or complements the others:

First, near term focused and monitoring missions which are part of NASA's ongoing science program. These include spacecraft missions, such as the Upper Atmosphere Research Satellite (UARS), Shuttle Spacelabs (such as the ATLAS series), Landsat, the Explorer-class Earth Probes series (ozone, ocean winds, tropical rainfall, gravity, topography, etc.), as well as support for aircraft and in situ research, and cooperative missions with our international partners and other federal agencies.

Second, a research base for scientific analysis, including development of the Earth Observing System Data and Information System (EOSDIS). EOSDIS will offer researchers unprecedented access to Earth science data, as well as archive the data and control the EOS spacecraft. NASA will also seek agreements on data exchange and access to make global change data from all nations available to the broad scientific community.

The prototype EOSDIS will be on-line in 1994 for near term science operations. This system will evolve to match technological progress and advances in flight systems. NASA is supporting teams of disciplinary and interdisciplinary scientists who will evaluate data from all elements of the Mission to Planet Earth efforts and design global climate models needed to understand and predict the Earth's behavior.

Third, a core **Earth Observing System (EOS)** designed to gather a 15-year data set on the Earth's coupled systems. These observations will be made by several series of EOS spacecraft, each designed to examine a different aspect of the Earth.

Fourth, a group of **follow-on EOS missions** designed to continue existing measurements and provide new perspectives on the global environment. These will include follow-on Earth probes and development of the EOS Synthetic Aperture Radar (EOS SAR) and geostationary platforms.

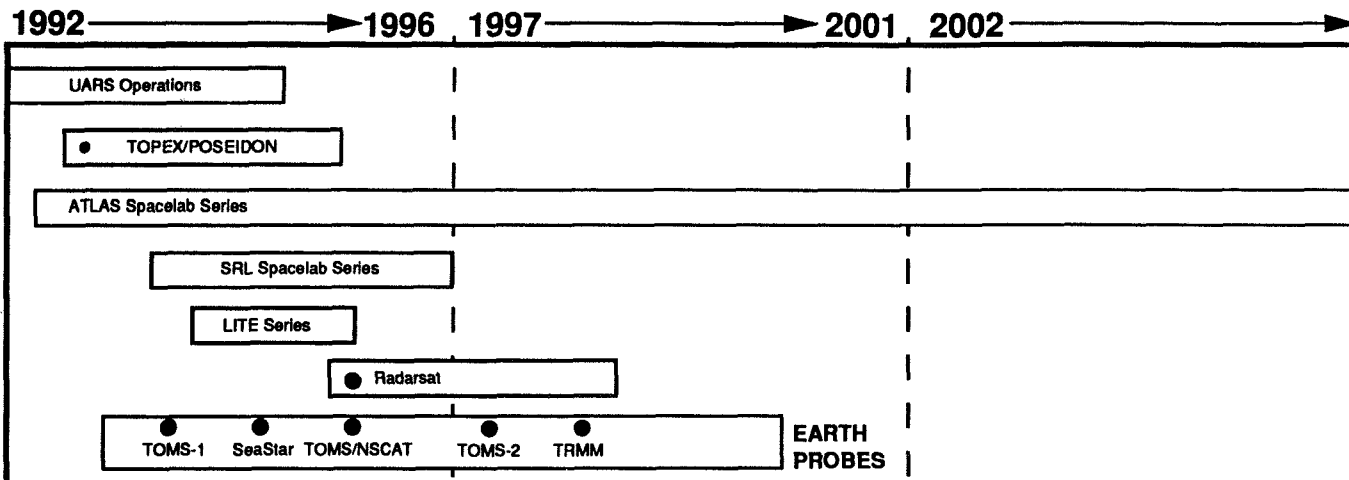
Mission to Planet Earth programs are expected to double the community of researchers dedicated to understanding global change. Already, the Global Change Fellowship Program is providing a unique educational opportunity for graduate students in Earth system science research, and more opportunities will surface.

NASA's **Mission to Planet Earth** will substantially increase, with all due speed, our knowledge of the Earth's atmosphere, ocean, land, and life and how these vital components are interrelated. Mission to Planet Earth also will permit us to better discern what role humans play in affecting global change. Such knowledge is critical if we are to make sound policy decisions regarding the future of our fragile planet and protect the quality of life for our children and grandchildren.

Figure 2 depicts the key program elements of Mission to Planet Earth for the next decade and beyond.

MISSION TO PLANET EARTH STRATEGY

PHASE ONE MISSIONS



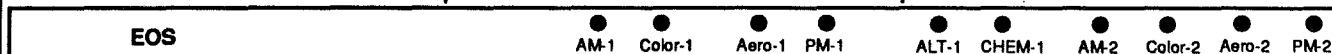
Operational Meteorological Satellites (NOAA and GOES) Series and Landsat

RESEARCH BASE



Ongoing Aircraft, Suborbital and Ground Research and Data Analysis

EOS CORE PROGRAM



FOLLOW-ON EOS MISSIONS

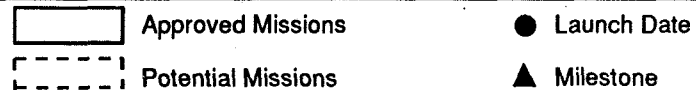
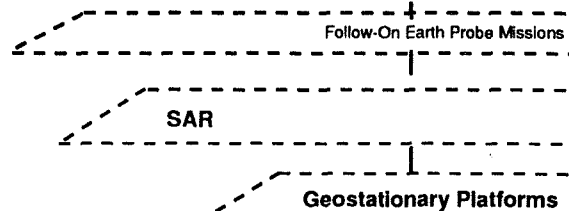


Figure 2

"There are moments in history when challenges occur of such a compelling nature that to miss them is to miss the whole meaning of an epoch. Space is such a challenge."

— James Michener

Mission From Planet Earth

On July 20, 1989, the 20th anniversary of the Apollo lunar landing, President George Bush gave NASA and the nation the ultimate set of challenges:

First, for the coming decade, for the 1990s, Space Station Freedom, our critical next step in all our space endeavors;

And next, for the new century, back to the moon, back to the future and, this time, back to stay;

And then, a journey into tomorrow, a journey to another planet -- a manned mission to Mars.

In response to the President's directive and pursuant to the guidelines and recommendations of the Advisory Committee on the Future of the U.S. Space Program and the Report of the Synthesis Group on America's Space Exploration Initiative, NASA is formulating and will lead a Mission from Planet Earth. It consists of an integrated set of research, science, and technology activities within NASA and at the Departments of Energy and Defense. Building on the Apollo program and experiences in Earth orbit, this national effort will employ complementary robotic and human exploration missions, minimizing cost and risk, while meeting the President's challenge.

By virtue of the mission's duration, nearly 30 years, these activities will be undertaken in increments. In addition, the Mission from Planet Earth will place special emphasis on developing special programs that maximize potential contributions to broader national goals, such as economic strength and educational excellence. Furthermore, international participation in the program will be sought.

The first major initiative in this program, as directed by the President, is the **development and deployment of Space Station Freedom** starting with the first element launch in 1995, man-tended capability in 1997, and permanently manned capability in fiscal year 2000. Space Station Freedom enables continued progress in the human exploration of space through the prerequisite studies into human adaptation and testing of life support systems over an extended period of time. The Space Station Freedom program also will give us the base of knowledge needed to build, operate and maintain large systems in space, experience that can be gained nowhere else. Freedom is indeed a critical first step of the Mission from Planet Earth and a visible symbol of America's commitment to leadership and cooperation in the peaceful exploration of space. With the establishment of a permanent human

presence in space, the United States and its international partners will have, for the first time, a permanent outpost in space for performing fundamental research that will pave the way for eventual human exploration of the solar system.

During the coming decade, NASA will **extend the duration of manned Space Shuttle flights** in order to prepare for future long-duration space flights and the advent of Space Station Freedom. Concurrently, NASA is planning to initiate a series of robotic lunar orbiter missions designed to collect essential geodetic, resource, and terrain information, as a prelude to establishing a manned lunar outpost. These activities will commence with the Lunar Terrain and Lunar Resource Mapper. The agency also is assessing the development in the mid-1990s of a common lunar lander, capable of delivering science, engineering, and other payloads to the Moon's surface. In the longer term, other potential **unmanned precursors** will address communications and navigational requirements. All these exploration missions will be designed and executed with an emphasis on the efficient and innovative use of our national space resources, including those of other federal government agencies, the private sector, and academia. Other unmanned precursor missions will add further to our body of scientific knowledge, such as the already planned Mars Observer to be launched in 1992 under the Space Science Mission.

During this period, NASA will also be pursuing the definition, advanced systems development, flight demonstration, and mission extension capability activities required to meet the challenges of Mars exploration. Lunar activities, both unmanned and manned, will also serve as valuable test-beds for validating exploration technologies and approaches. Early in the next century, robotic rover and sampling missions to Mars will begin to set the stage for subsequent piloted missions.

The key programmatic elements of the Mission from Planet Earth for the next decade and beyond are depicted in Figure 3.

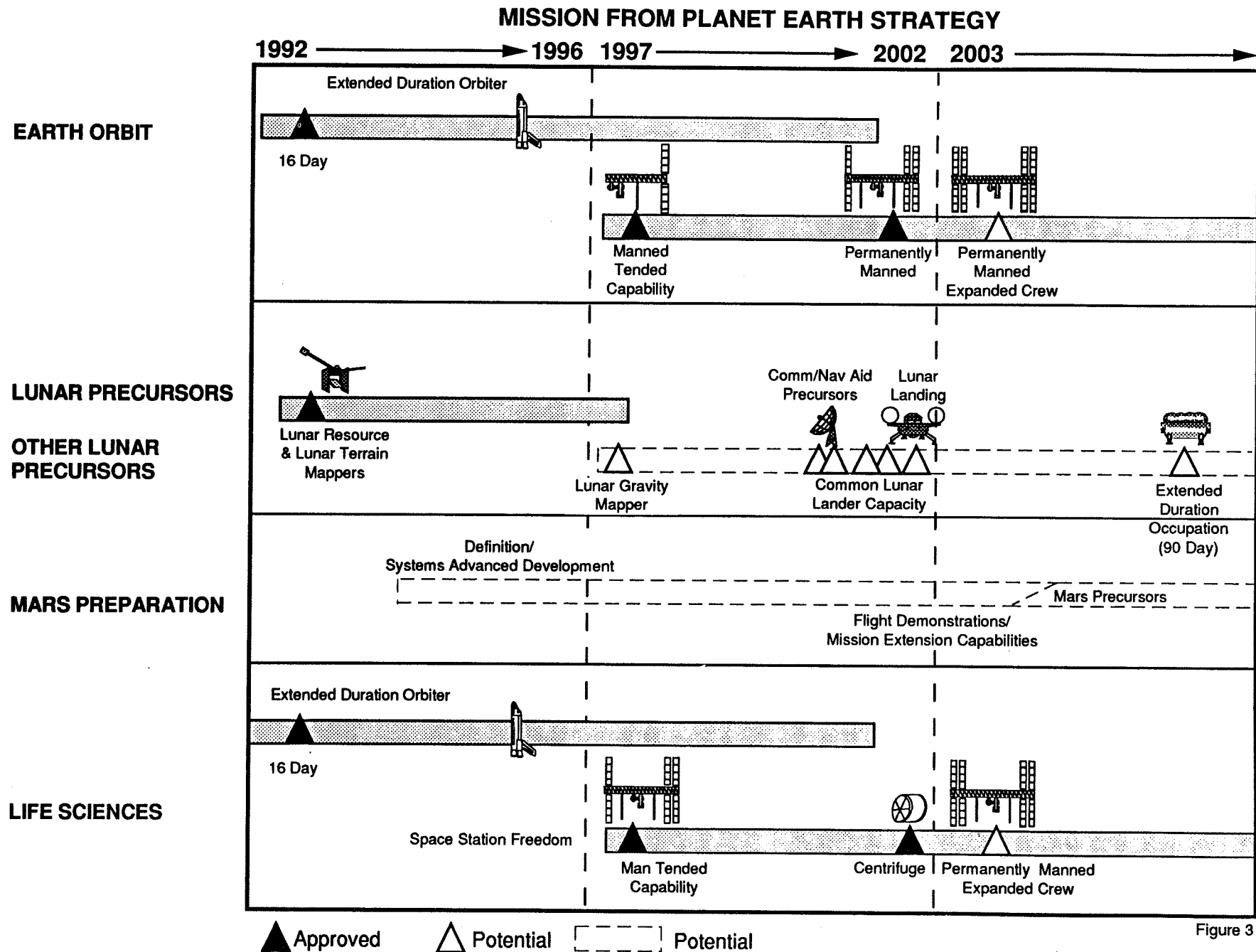


Figure 3

"By original scientific research the Wright Brothers discovered the principles of human flight. As inventors, builders, and flyers, they further developed the aeroplane, taught man to fly, and opened the era of aviation."

— Plaque on 1903 Wright Flyer

Mission - Aeronautics Research

Aeronautics has long held a unique position in its contribution to the nation's balance of trade, worldwide competitive posture, transportation infrastructure and defense. The aeronautical research and technology programs of NASA and its predecessor, the National Advisory Committee for Aeronautics (NACA), have played a key role in this story since 1915. It has been perhaps the most successful example of a government-industry partnership in this country. The NASA-NACA experience has earned this agency the reputation as the nation's leader for aeronautical research and technology. However, as successful as these efforts have been, the challenges of the 1990s, including the emergence of formidable foreign competition and increased congestion in our air transportation system, mean that NASA must strengthen its capabilities and take a more assertive role in coordinating and facilitating long-term United States research efforts.

NASA will advance and preserve the United States role as a leader in aerospace technology and its application in the coming decade by:

Developing, in cooperation with U.S. industry, selected high-leverage technologies and exploring new means to ensure the competitiveness of U.S. **subsonic aircraft**;

Developing, in cooperation with U.S. industry and the Federal Aviation Administration, technologies that enhance the safety and productivity of the **National Airspace System**;

Resolving the critical environmental issues and establishing, in cooperation with U.S. industry, the technology foundation for economical **high-speed air transportation**;

Providing a proven technology base to enable unprecedented levels of maneuverability and agility in future **high-performance aircraft** for national defense security purposes;

Readying the technology options for new capabilities in future **rotary-wing aircraft**; and

Developing, and demonstrating in flight, the technologies required for **transatmospheric/single-stage-to-orbit** vehicles with airbreathing primary propulsion and horizontal takeoff and landing capability.

Aeronautics base research and technology will continue to maintain national leadership by:

Pioneering the development of **innovative concepts**, providing the physical understanding and the theoretical, experimental and computational tools required for the efficient design and operation of advanced aerospace systems; and

Accelerating the development and application of **high-performance computing technologies** to meet NASA and other broad national needs.

The primary approach to achieving transatmospheric flight is the joint NASA/DOD National Aero-Space Plane program. The technology work is currently focused on unprecedented advances in propulsion, high-temperature materials and structures, and computational fluid dynamics. The near term objective is to bring this technology to an appropriate state of readiness for a major decision in late 1993 to design, build, and flight test two X-30 experimental vehicles. With a favorable decision, flight testing will begin by the end of the decade.

To quote the *National Aeronautical R&D Goals -- Agenda for Achievement* report, "The changing environment requires a new commitment and philosophy and a more cooperative relationship among government, industry, and the university community. NASA alone cannot guarantee success." But **in conjunction with the aerospace industry and research community, the program NASA has formulated for the next decade is a must if America is to retain its competitive edge in the twenty-first century in aeronautics.**

The key elements of the aeronautics program for the next decade and beyond are depicted in Figure 4.

AERONAUTICS RESEARCH STRATEGY

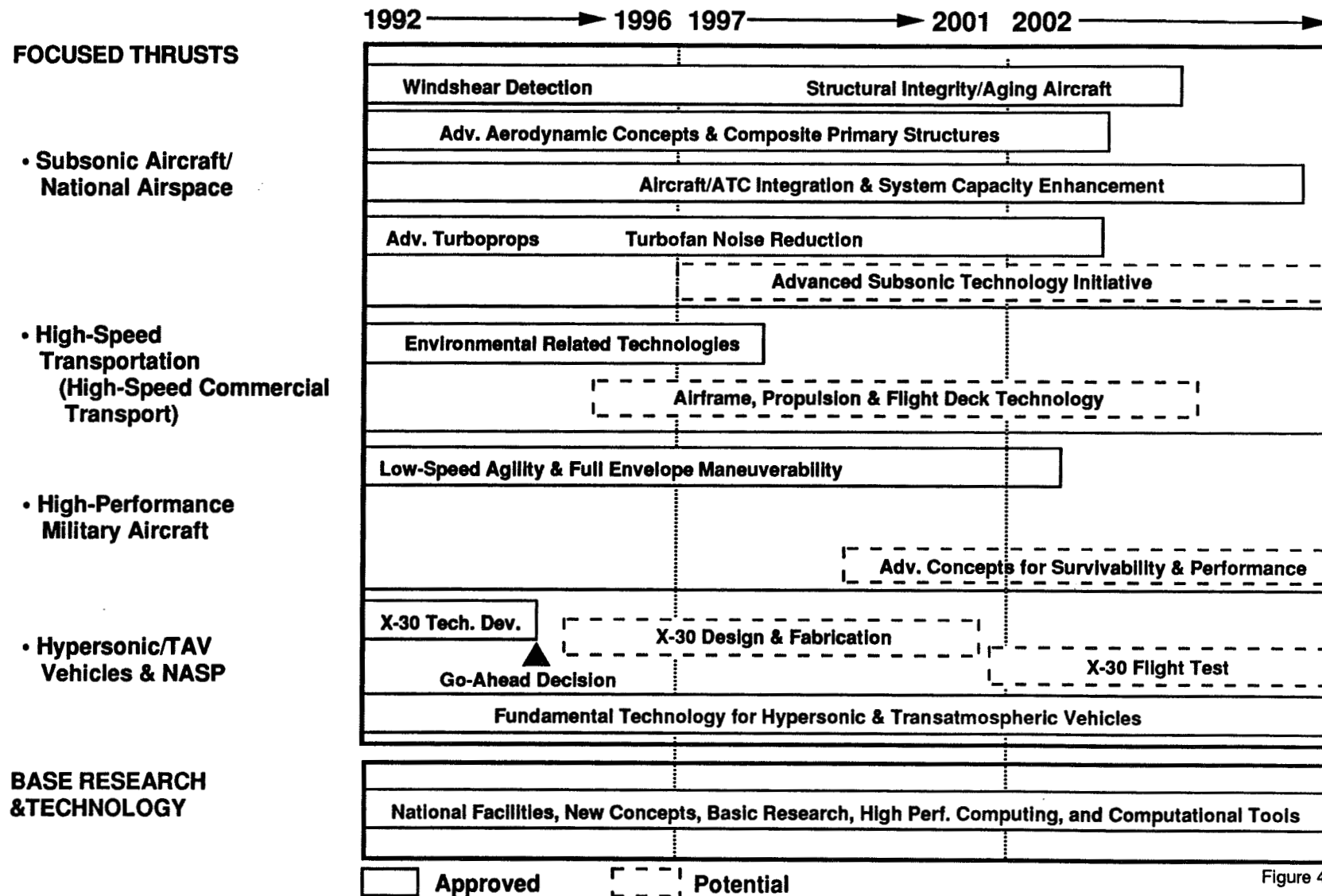


Figure 4

"NASA, and only NASA, realistically possesses the essential critical mass of knowledge and expertise upon which the nation's civil space program can be sustained."

— Advisory Committee on the Future
of the U.S. Space Program

Enabling Capability - Human Resources

The nation's civil space and aeronautics efforts depend on the people who will carry them out -- including those in academia who train our future leaders and conduct a large segment of our research, those in the private sector with whom we contract a major share of our development work and, of course, those in NASA. This is especially true as NASA scientists expand the frontier of knowledge and our engineers push the state-of-the-art in cutting-edge technologies to implement NASA's missions. And NASA's mission cannot be achieved without other skilled team members in such areas as management, procurement, finance, and personnel. Therefore, NASA must effectively use all its educational, personnel and training resources to field the strongest possible team. As the Advisory Committee on the Future of the U.S. Space Program noted, NASA must pursue a comprehensive program to attract, develop and maintain a world-class work force in support of Vision 21.

The first of the three vital components of the NASA human resources effort is its education programs. If NASA is to continue to attract and retain the "best and brightest" -- while at the same time helping to ensure a more technically literate society in the future -- our educational outreach program must target the entire educational pipeline through a well-coordinated strategy. This active outreach effort must capture student interest in science, mathematics and technology at an early age; channel more students into science, engineering and technology career paths; and enhance the knowledge, skills and experiences of precollege teachers, college and university faculty, and other educators. Central to this implementation strategy will be an evaluation of all the agencywide programs' contributions. This will help ensure the wise application of funds.

Once talented scientists, engineers, and other highly skilled workers are recruited, sophisticated personnel management systems become the second component of the human resource program. The benchmarks for such systems are challenging work, organized in a manner that optimizes efficiency and productivity; adequate compensation and recognition; and an environment that fosters creativity and well-being. NASA will provide such an atmosphere through the application of sound, forward-looking management techniques and the innovative use of its personnel authorities.

The third component of the human resources program is the training and development of the work force to ensure enhancement of technical capabilities and personal growth. One of the earliest initiatives that NASA will pursue is a

comprehensive career development program. This program will have reached maturity when each employee, together with his/her supervisor, has a fully described set of possible career paths for that employee's skills and interests. This effort will start with an analysis of the best practices across the agency for later synthesis into an agencywide program. Also included in the career development program will be a series of educational, training and broadening opportunities which the employee, bolstered by active supervisor participation, can select to assure successful progression along whichever career path that employee chooses.

Vision 21 calls upon the agency to inspire the American people through exemplary performance of its missions. Exemplary performance, which is characterized by a recognized world leadership role, conversely can be achieved only through the inspired support of the American people. **NASA can best inspire if it is composed of a work force that reflects the cultural diversity of America's talented population so that everyone can see themselves reflected in this world-class team.**

The key challenges for the NASA human resources and education component for the next decade are depicted in Figure 5.

HUMAN RESOURCES STRATEGY**EDUCATION**

Capture Student Interest at Early Age
Channel Students into Science and Engineering Careers
Enhance Experiences & Skills of Teachers

**PERSONNEL
MANAGEMENT**

Improve Workforce Planning & Allocation Framework
Refine Executive Succession Planning
Acquire Workforce Reflecting Population Diversity
Enhance Compensation & Recognition Programs
Foster Work Environment for Health & Well-Being
Use Personnel Authorities Imaginatively

**TRAINING &
DEVELOPMENT**

Refine Employee Career Development Program
Enhance Executive, Management & Supervisory Development
Improve Technical Skill Maintenance Opportunities
Formulate New Project Management Training Methods
Facilitate Organizational & Team Development

Figure 5

"Many small make a great."

— Chaucer

Enabling Capability - Physical Resources

To implement a diversified civil space and aeronautics program, NASA must maintain existing world-class facilities as well as provide for future requirements. Currently, NASA has an agencywide initiative in place to **restore, maintain and construct world-class facilities**, in that order. Significant progress has been made and will continue on a five-year wind tunnel revitalization program and on upgrading data storage facilities.

Major efforts are under way to maintain NASA facilities and launch pads and to ensure compliance with environmental laws and regulations. NASA will work to increase the fraction of funding allocated for facilities maintenance and will place increased emphasis on the management and maintenance of these vital assets during the next decade.

There also are major **facility expansion activities** under way across NASA to construct the facilities required to develop, assemble, test, operate and maintain Space Station Freedom and Mission to Planet Earth, and to sustain ongoing programs such as the Space Shuttle and the Tracking and Data Relay Satellite system. Space Station Freedom, for example, requires new processing, avionics and space systems facilities, automated integration and assembly facilities, additions to mission control and the simulator/tracking facilities, and a new orbital debris radar facility. The Mission to Planet Earth project will require a facility to house one of the most capable data management systems ever built or operated, the Earth Observing System Data Information System (EOSDIS) facility. Based on preliminary estimates, the operations in the EOSDIS facility, initiated in 1991, will handle 10 terabytes of data every day -- roughly the equivalent of 10 warehouses of magnetic tapes. New facilities are also required for the development, fabrication and testing of the space science instruments of tomorrow. In addition, the state-of-the-art Numerical Aerodynamic Simulation System has been constructed and fully equipped with cutting-edge supercomputers to help maintain the aerospace industry's edge in the world market.

Besides the physical plant, **NASA must also maintain, upgrade and replace equipment**, everything from computers and rocket engine test stands, to research and mission aircraft and life sciences research equipment. As with facilities, NASA is committed to maintaining its existing capabilities. However, to push the edge of technology and to implement NASA's complex technical and engineering programs, NASA will be required to procure state-of-the-art equipment on a continuous basis.

Finally, to ensure mission success, efficient program management, and the proper use of facilities and equipment, NASA, during the next decade, will **strengthen its business and technical management systems and use state-of-the-art information technology** to improve systems and processes. NASA is a highly diversified agency that must manage research, technology and operational programs.

To ensure the best and most efficient utilization of its resources, NASA must procure advanced management and information technology.

The key elements of the NASA physical resources strategy are depicted in Figure 6.

PHYSICAL RESOURCES STRATEGY

FACILITIES

Restore Mission Infrastructure
Construct New Facilities
Maintain Physical Plant
Ensure Full Environmental Compliance

EQUIPMENT

Maintain, Upgrade and Replace:

- **Mission and Research Aircraft**
- **Multiprogram Equipment**

Provide Programmatic & Administrative Computing Resources

MANAGEMENT SYSTEMS

Strengthen Business and Technical Processes
Improve Systems and Processes by the Use of Information Technology

Figure 6

"American leadership on the space frontier requires aggressive programs in technology development. Indeed, our nation's future requires that we lead in those technologies that have the greatest implications for twenty-first century America's economic productivity, health, security and national spirit."

— Pioneering the Space Frontier
(Paine Report)

Enabling Capability - Space Technology

NASA's technology programs that enable the achievement of United States civil space goals also support U.S. technological competitiveness. This is done by the establishment of a clear and coherent strategy for civil space research and technology development for the coming decades.

The importance of this enabling capability has been a consistent theme of internal and external advisory groups for the past several years. Our investment in space technology today will reduce the cost of future space systems as the United States aggressively pursues its civil space goals.

During 1991, NASA responded to the findings of the Advisory Committee on the Future of the U.S. Space Program by developing an **Integrated Technology Plan** for the civil space program. This plan is designed to serve both as a strategic plan for the NASA space research and technology (R&T) program and as a strategic planning framework for national space R&T participants in conducting engineering research that supports future U.S. civil space missions. The plan is founded on a long-range forecast of U.S. civil space activities and advanced technology needs, which has been developed based on inputs from NASA's own program offices, other government agencies and the private sector, and recent external reports including the Synthesis Group on America's Space Exploration Initiative.

The Integrated Technology Plan categorizes space R&T into five focused program thrusts that address the needs of future civil space missions: space science, planetary surface technology, transportation, space platforms, and operations technology. Key technology program objectives include: advanced propulsion, materials and avionics for both the next manned launch system and future space transportation vehicles; sensors, platform technologies and information systems for space science missions; power, life support and surface system technologies for robotic and human exploration missions; and advanced technology for commercial Earth-to-orbit transportation and telecommunications satellite applications.

Continuing investment is also needed in NASA's research base, which provides support for both fundamental research disciplines and innovative new concepts. The program is comprised of a continuum of space R&T activities, ranging from initial research through technology development to technology validation to ensure

successful transfer to users. Planned efforts include activities at the NASA Centers by university researchers supported by NASA-funded grants and contracts and by industrial aerospace organizations under contract to NASA.

Timely transfer of selected new technologies is a key ingredient of NASA's space R&T programs. NASA's principal goal is to achieve successful technology transfer within the aerospace community largely through direct interactions between researchers and project engineers. In addition, technology is widely recognized as a vital ingredient in the continuing economic competitiveness of the nation. NASA will, therefore, also continue to emphasize the dissemination of technological information to the broader economy, through such innovative mechanisms as the Technology Utilization Program, Centers for the Commercial Development of Space, and government/industry partnerships.

University involvement in NASA technology efforts has been increased recently with the advent of university-based Space Engineering Research Centers and Historically Black Colleges and Universities Research Centers. This involvement will further expand.

As was noted in the Report of the Advisory Committee on the Future of the U.S. Space Program:

"Unlike research which seeks new knowledge, technology is concerned with the application of that knowledge to useful purposes. The development of advanced technology is thus crucial to the success of the exploration and exploitation of space -- whether human or robotic."

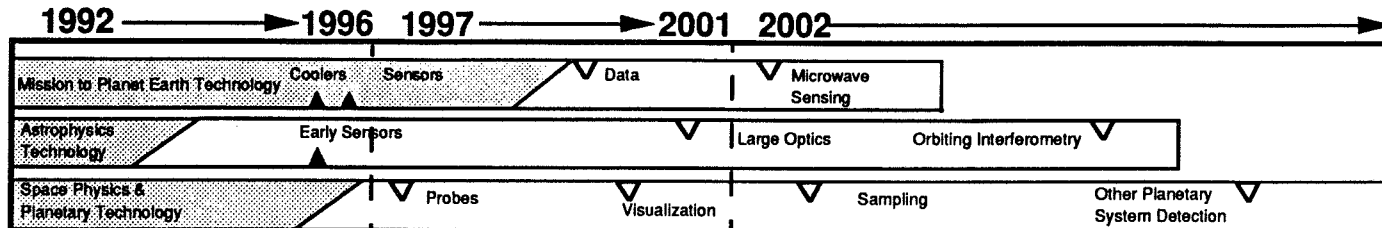
The key elements of the NASA technology program for the next decade and beyond are depicted in Figure 7.

SPACE TECHNOLOGY RESEARCH STRATEGY

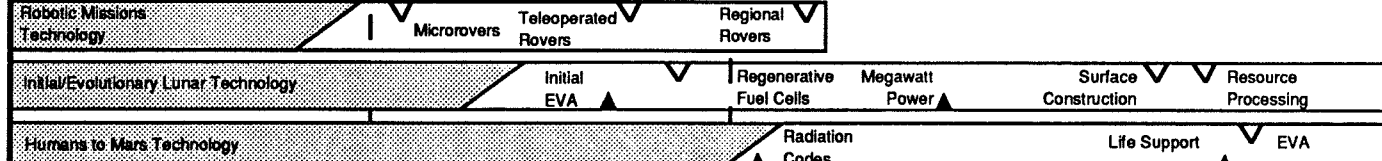
DELIVERY TARGETS FOR SELECTED RESEARCH AND TECHNOLOGY PRODUCTS

FOCUSED THRUSTS

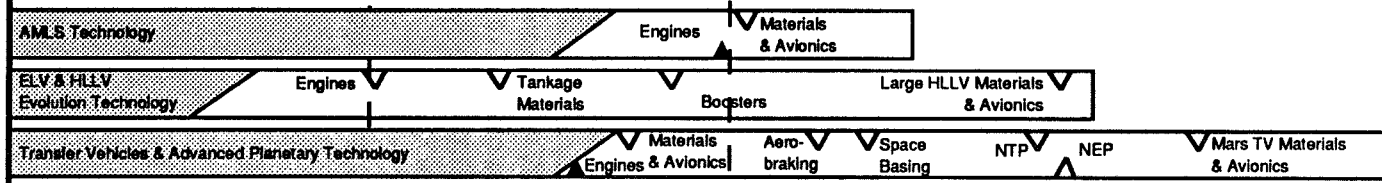
• Space Science Technology



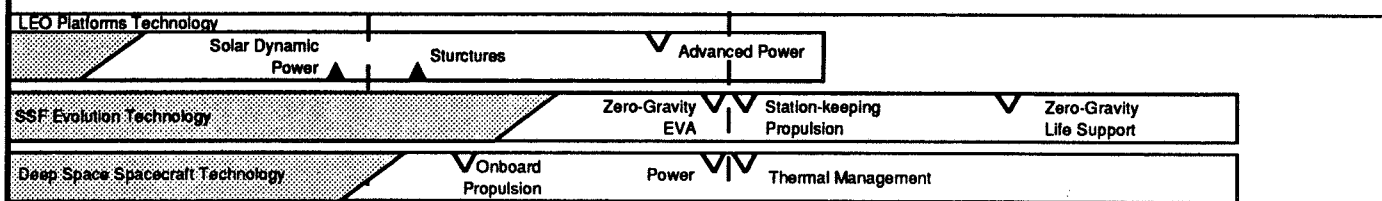
• Planetary Surface Technology



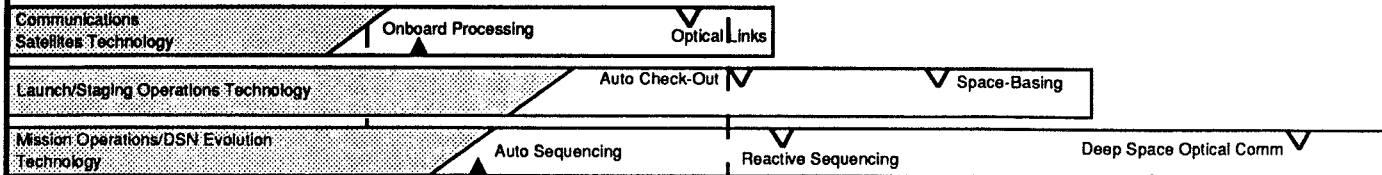
• Transportation Technology



• Space Platforms Technology



• Operations Technology



RESEARCH BASE



Figure 7

"All that we have already accomplished, and all in the future that we shall achieve. . . is the product of unrestrained human talent and energy restlessly probing for the betterment of humanity."

— Dwight David Eisenhower

Enabling Capability - Space Station Freedom

Space Station Freedom is the critical next step for advancing the human exploration of space. It is a multipurpose, continuously habitable facility in low Earth orbit that will:

Serve as a permanent outpost where we will learn to live and work productively in space;

Provide an advanced research laboratory to explore space, employ its resources for the benefit of humanity, and conduct life sciences and microgravity research; and

Provide the opportunity to learn to build, operate and maintain systems in space.

Freedom will be a permanently manned capability in space, one that will continue to support the development of new technologies and procedures for our manned space program, and capitalize on the unique microgravity environment of low-Earth orbit for advancement of science and technology with broad applications for mankind. The program provides for major participation by Canada, Japan and 10 members of the European Space Agency, demonstrating the value of international cooperation in large space ventures.

Freedom's capabilities will support the Mission from Planet Earth with basic research on the effects of prolonged low gravity on human physiology; engineering research and development of life support systems; design and construction of large space systems; and testing and evaluation of space operations concepts. Freedom's capabilities will promote the development of technologies of national importance in areas such as advanced materials and robotics and commercial applications of pharmaceuticals, semiconductors, and superconductors. Space science research will be supported in the areas of fundamental investigations in fluid physics, materials science, biotechnology, gravitational biology, and biomedical research.

As a result of the program restructuring that took place in 1990 pursuant to the guidance and direction of the Appropriations Committees, Space Station Freedom will be developed in discrete phases to provide early, significant results within available funding. This approach allows the program to proceed at a pace consistent with Presidential and Congressional direction, user demand, and launch constraints. Three phases are defined for Freedom: the Initial Phase, which will provide Man-Tended Capability (MTC) during assembly and culminate in a Permanently Manned

Capability (PMC) for a crew of four; the Follow-on Phase, which will complete assembly to support a crew of eight; and the Growth Phase, which will provide enhancements based on operational experience and advances in technology. Only the Initial Phase is presently provided for in the NASA budget.

The two major milestones of the Initial Phase are the achievement of MTC and PMC. Significant research capabilities are available at MTC with the delivery of the U.S. pressurized laboratory. Initial crew stay times of 13 days and longer, supported by the Extended Duration Orbiter, will enable interactive experimentation in life sciences and microgravity sciences--areas of research which were identified by the Advisory Committee on the Future of the U.S. Space Program as the two primary missions of Space Station Freedom. Mini-Pressurized Logistic Modules provided by Italy will enable flexible logistics operations beginning with MTC. Experimental facilities and power will expand during this phase as assembly for PMC is completed.

Between Shuttle visits, long-duration exposure to the microgravity environment will be available for remotely controlled life sciences and materials science experiments. The Canadian-supplied Mobile Servicing Center will contribute to assembly and servicing, and the Japanese Experiment Module and the Attached Pressurized Module provided by the European Space Agency will triple the available volume to experimenters over that available at MTC. The PMC configuration ushers in the era of continuous operations, features a permanent crew of four, and provides levels of power never before available for research in a manned orbiting facility.

Expert systems technology will be employed to automate and improve the monitoring and maintenance of Freedom's systems health. Provisions have been made in the Station design to enable growth and upgrades to the Follow-on and Growth Phases. In the Follow-on Phase, enhancements will be added to Freedom in a prioritized manner, contingent upon user demand and funding availability. The first enhancements will raise Freedom resource levels to those consistent with international agreements, which include a fourth photovoltaic array to achieve 75 kW of power and a crew capability of eight.

Freedom will evolve in response to future user demands and advances in technology. Although future user requirements are not fully defined, Freedom is designed for flexibility to allow a wide range of choices in evolving to specific configurations.

The key components of the Space Station Freedom program are depicted in Figure 8.

SPACE STATION FREEDOM STRATEGY

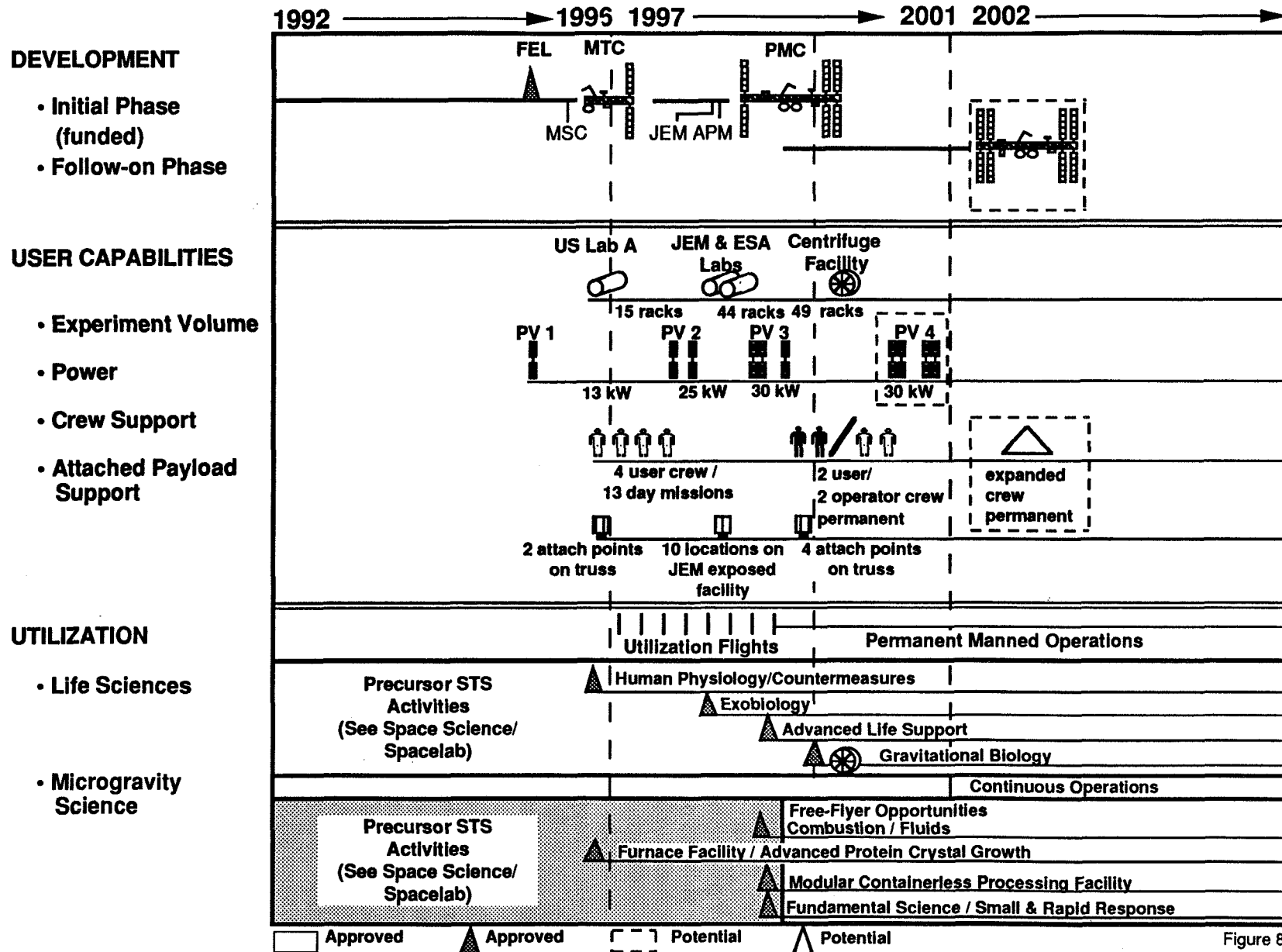


Figure 8

*"We shall not cease from exploration
And the end of all our exploring
Will be to arrive where we started
And know the place for the first time."*

— T. S. Eliot

Enabling Capability - Space Transportation and Communications

The National Space Launch Strategy signed by President Bush in 1991 is focused on meeting the U.S. Government civil space launch needs while developing the new launch systems and capabilities necessary to meet future requirements.

NASA is committed to use of a **mixed fleet** of the Space Shuttle and expendable launch vehicles -- the latter to be obtained whenever possible from U.S. commercial launch service providers. The civil launch needs through this decade include science payloads, Earth observation payloads, Spacelab missions, and assembly and utilization of Space Station Freedom.

The **Space Shuttle** uniquely enables the nation's space activities that require the involvement of astronauts and payload specialists. The Space Shuttle carries people, equipment, and payloads into space and later returns them safely to Earth. When combined with the Spacelab or other carriers, such as the commercially developed Spacehab, the Shuttle becomes a **space laboratory** where crewmembers can interact with experiments. Spacelab, in particular, will play a key role in an evolutionary approach to developing the scientific and technological foundation for research programs to be conducted on Space Station Freedom.

Key elements of NASA's Shuttle strategy are: to maintain and improve Shuttle systems and supporting facilities; to extend on-orbit stay time; to extend Shuttle life through critical subsystem upgrades; to maintain the capability to manufacture an additional orbiter should the need arise; and to limit use of the Shuttle primarily to those missions requiring the presence of humans or other Shuttle-unique capabilities. As the nation moves towards the development of a new space launch system, the National Launch System, the production of additional Space Shuttles is not planned. The production of spare parts should continue in the near term to support the existing Shuttle fleet, and to preserve an option to acquire a replacement orbiter in the event of an orbiter loss or other demonstrable need.

NASA is studying and implementing various improvements in the Shuttle program to achieve a 15-percent reduction in operations cost by 1996 and to improve the avionics, propulsion, and engine components.

NASA acquires and will continue to acquire small, medium and intermediate **expendable launch services** through commercial launch service agreements and large expendable vehicles (Titan IV) through the Department of Defense (DOD). The agency also funds limited improvements to satisfy NASA mission requirements and

provides access to NASA property and services on a noninterference, cost-reimbursable basis.

NASA and DOD have jointly proposed development of a new national launch system, pursuant to the recommendation of the Advisory Committee on the Future of the U.S. Space Program, "that the Administration promptly establish and fund a firm program for development of an evolutionary, unmanned but man-ratable, heavy-lift launch vehicle." Emphasis currently is being placed on developing a new engine for this system. The **National Launch System (NLS)** will strengthen our launch assurance posture in support of scientific, national security, commercial, and Space Station Freedom payloads; and, through evolution, the NLS will support the larger, heavier payloads to support Mission from Planet Earth.

The National Launch System would reduce launch system operating costs and provide for improvements in reliability, responsiveness, and mission performance. It would lead to the development of a family of vehicles and would strengthen the technical base for improvements in commercial launch vehicles. The first launch of the new system is planned for 2002.

Transportation study efforts under way or planned include: definition of a crew return capability to support Space Station Freedom permanently manned requirements; definition of NLS growth options; comprehensive studies to assess long-range manned transportation strategies; and analysis of longer Shuttle orbit stay times beyond the current 16-day target of the Extended Duration Orbiter program.

The capability to command, control and communicate with -- and receive, process and distribute data from -- space vehicles and aircraft also is a vital enabling element in NASA's structure.

The **Space Network** is a highly sophisticated communications system that includes the Tracking and Data Relay Satellites (TDRS) in geostationary orbit and two ground stations. During the remainder of this century and the first decade of the next, its capabilities will be sustained by the TDRS II follow-on spacecraft. To meet the dramatic cumulative increase in requirements of the Hubble Space Telescope, Compton Observatory, UARS, Space Station Freedom, EOS, AXAF and other missions being planned, NASA is planning to increase the current three-spacecraft TDRS constellation by the end of the decade.

The **Ground Networks** program provides the Earth-based tracking and data acquisition required primarily by vehicles in deep space such as Magellan, Galileo, Ulysses, and Mars Observer. In the mid-to-late 1990s, substantial additional aperture is required to meet these mission needs.

The **Communications and Data Systems** effort must meet the quantum jump in data rates from spacecraft that incorporate the many advances made in communications and computing technology. Plans also must be made for the efficient use of the radio spectrum currently available for space activities along with the new spectrum allocations that are being requested.

No technology arena is changing faster than those involving communications and information processing. In this environment, all sectors of NASA's communications activities face a major challenge: simultaneously maintaining current operating capabilities while integrating new technologies into the existing infrastructures -- and doing so in a cost-effective manner. As NASA prepares for the exploration of the Moon and Mars, first with complex robotic missions and then by humans, there will be an even greater demand for an efficient, integrated communications system. The foundation for these activities must be thoroughly planned and developed over the next decade.

The key capabilities and enhancements required during the decade of the 1990s by NASA's space transportation and communications programs are outlined in Figure 9.

SPACE TRANSPORTATION AND SPACE COMMUNICATIONS STRATEGY

1992

1996 1997

2001 2002

OPERATIONS

- Space Transportation

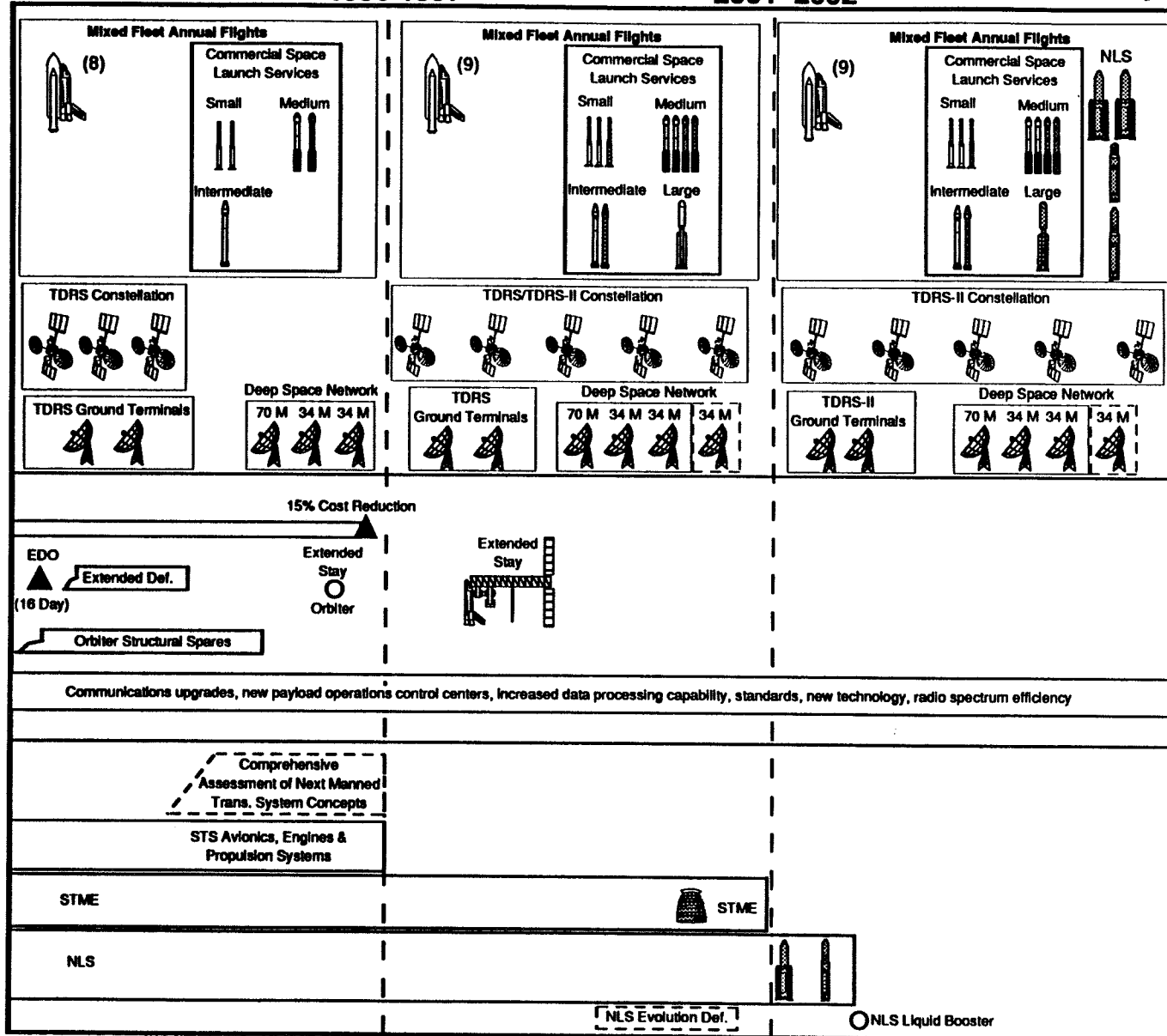
- Space Communications

OPERATIONAL IMPROVEMENTS

- Space Transportation
- Communications & Data Systems

CAPABILITY DEVELOPMENT

- Improved/Enhanced
- Proposed



NOTES: NASA assumes the launch of 8 Space Shuttle flights per year in 1992-1996 and 9 flights per year in 1997 and beyond.

The first launch for NLS is planned for 2002.

Approved

Potential

Figure 9

"The highest and best form of efficiency is the spontaneous cooperation of a free people."

— Woodrow Wilson

Management Initiatives

To implement the programs and provide the capabilities called for in Vision 21, a series of management initiatives must be successfully implemented during the first half of the decade of the nineties. The focus of these initiatives are five activities that began in 1991 as a result of internal management assessments and the recommendations of the Advisory Committee on the Future of the U.S. Space Program: Human Resources Management, Program and Project Management, Procurement Management, Facilities Management, and Centers of Excellence. Each of these initiatives will be reviewed annually, updated and/or completed. All five have expected completion times of less than five years and are part of a new "5x5" strategy -- an ongoing management improvement process that will continually support five key initiatives with five-year targets for completion.

Each of these initiatives is an element of the larger NASA continuous improvement program. This program strives to instill in NASA the philosophy of continually making NASA a more excellent agency. Continuous improvement is a key ingredient in the successful implementation of the **Vision 21** strategy and in the successful completion of the management initiatives outlined below.

Human Resources Management -- NASA educational programs will be evaluated for cost effectiveness and the efficient allocation of resources to the fulfillment of NASA's educational vision. The position management system will be sharpened to improve the links among program efforts and work force requirements, staffing allocations, and skill mix. The optimum mix of in-house versus outside work will be determined. An agencywide career development plan will be published which will cover every career area large enough to warrant a tailored plan. Finally, the Strategic Plan for Personnel will include a plan for achieving a work force which reflects the diversity of America's talented population.

Program and Project Management -- During the last decade, NASA has emphasized performance/capability in managing its programs and projects. In today's severely constrained fiscal environment, schedule and cost are as critical to program success and public support as, for example, spacecraft performance. NASA, therefore, will formulate program and project management techniques and training methods that better prepare NASA managers by heightening their awareness of issues related to technical readiness, requirements and resources. Initiatives are under way to provide such techniques and training, and this process will be continuously improved.

Procurement Management -- To ensure that NASA receives the maximum value for each dollar invested in the civil space program, NASA has initiated a series of procurement management initiatives. Included in this set of initiatives will be an

acquisition streamlining program including the development of a new mid-range procurement process, an assessment of award-fee contracts, improvements to the NASA grant process, and improvements to the contract management and contract performance assessment processes. These, and other procurement initiatives, will be implemented with the overall objective of establishing NASA as the standard of excellence and innovation for government procurement.

Facilities Management -- NASA operates and maintains a diverse set of world-class research, development, and operational facilities. NASA has begun a variety of initiatives to improve maintenance of these facilities. These include the development and publication of agency policies in the form of a directive and a handbook which specify objectives, assign responsibilities, and promote commonality and excellence among Centers. Other initiatives will include the establishment of consistent maintenance standards for use by all Centers.

Consistently high maintenance standards, along with restoration and modernization and construction of facilities, are a high NASA priority and a critical element of the successful implementation of the agency's mission.

Centers of Excellence -- NASA will sharpen the focus of its Centers of Excellence and eliminate redundancy and fragmented activities. Centers of Excellence will be established at the nine NASA Centers. These Centers will be limited to well-defined technologies and disciplines of importance to NASA's overall mission capabilities and the nation's critical technology requirements. NASA Headquarters will give each of these Centers the flexibility required to attain reputations for excellence in their designated fields. Centers of Excellence will enhance NASA's overall reputation and capability and help attract and retain world-class scientists, engineers, and technicians.

The combined effect of these five management initiatives should be a NASA better equipped to meet the challenges of the twenty-first century and to maintain United States leadership in space exploration and aeronautics research.

*"It is difficult to say what is impossible,
for the dream of yesterday is the hope of
today and the reality of tomorrow."*

— Robert Goddard

Budget

During the history of the civil space and aeronautics program, there have been severe peaks and depressions in the availability of resources based on national priorities and budget constraints. These can be seen in Figure 10. However, since the mid-eighties, NASA has earned the sustained support of the Congress and the White House and has experienced adequate annual levels of growth at a time when the overall federal budget was severely constrained. Clearly, NASA is seen as an important element of the nation's overall economic health and well-being and a symbol of sustained United States technological leadership -- a key ingredient of success in the world marketplace.

Vision 21 is structured on the premise that the fiscal year 1993 budget will achieve 5-percent nominal growth and potential outyear funding -- annual outyear budget increases -- will be in the range of 5-8 percent nominal growth. The fiscal year 1993 assumption is consistent with the Congressional guidance obtained in the Fiscal Year 1992 VA-HUD-Independent Agencies Appropriations Bill Conference Report. Within this funding profile, NASA will implement a balanced and diversified civil space program -- a leadership program -- and will emphasize the successful implementation of its ongoing programs, those things it "must do." The agency also will strive to make progress on the next generation of activities, those things it "should do." However, implementation of these potential activities may require additional resources above the Congressional budget guidelines or a reprioritization of ongoing activities within the proposed budget runouts. **The key to success for NASA during the next decade will be the combination of stable and predictable funding and maximum management flexibility.**

While it is true that the nation faces severe fiscal and budgetary problems, it also is true that NASA and the civil space and aeronautics program today represent **an investment in America's future and in our youth's future**, much as they did 30 years ago when John F. Kennedy challenged this nation to "commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to the Earth." While most of us remember this phrase, few of us remember that it was contained in a special Presidential message to the Congress on "Urgent National Needs."

As NASA prepares for the next century, as we venture into the world of tomorrow, the agency will go forward with resolve to maintain United States leadership in space exploration and aeronautics research. As President Kennedy said in that same address, "If we are to go only halfway, or reduce our sights in the face of difficulty, in my judgment, it would be better not to go at all."

**NASA'S BUDGET
FY 1961-2001
(1991 \$ in billions)**

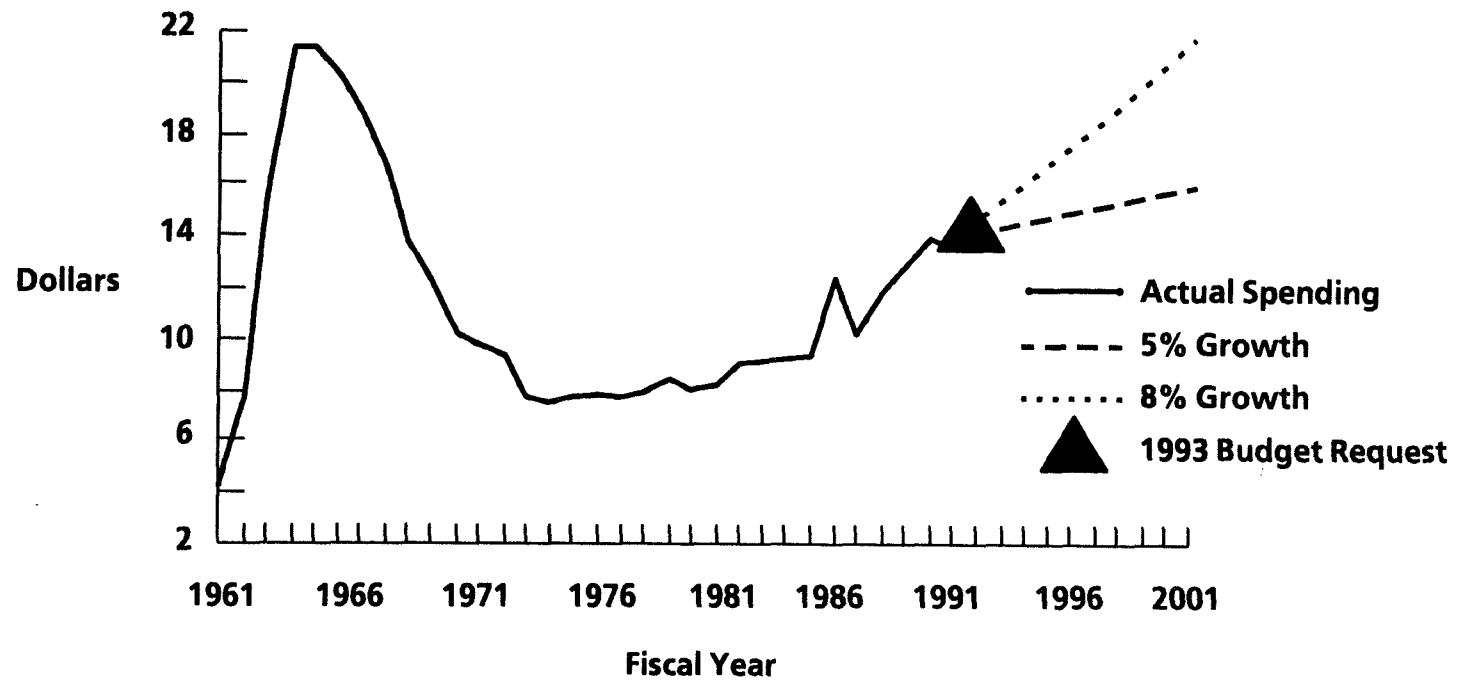


Figure 10

The NASA Strategic Plan, Vision 21, is a leadership plan -- it does not go halfway. Implementing this plan will require reasonable budget growth. It also will require fiscal discipline and the agencywide application of good management techniques. In times of resource shortages and budget austerity, it is necessary to get a higher rate of return on every dollar spent within NASA. Towards this end, NASA will initiate cost control measures, pursue efficiency gains, and reduce unnecessary administrative or management costs.

Decision-Making Guidelines

NASA will reassess its strategic plan and the priority status of its programs on a regular basis. This will ensure:

1. A well-balanced space and aeronautics program;
2. Attainment of the agency's goals and missions;
3. Consistency with Presidential and Congressional directives; and
4. Sustained United States leadership in space exploration and aeronautics research.

In implementing the strategic plan, the agency will maintain a balanced space and aeronautics program, stress the successful execution of programs approved by the President and the Congress, develop the enabling capabilities required to support the agency's goals and missions, initiate new starts as fiscally feasible, and balance near term and long-term activities.

Strategic plans formulated by Headquarters offices and NASA Centers will be consistent with these decision-making guidelines and the overall agency strategic plan. Headquarters offices and NASA Centers will formulate implementation plans that set priorities and identify enabling capabilities.

NASA'S STRATEGIC PLAN

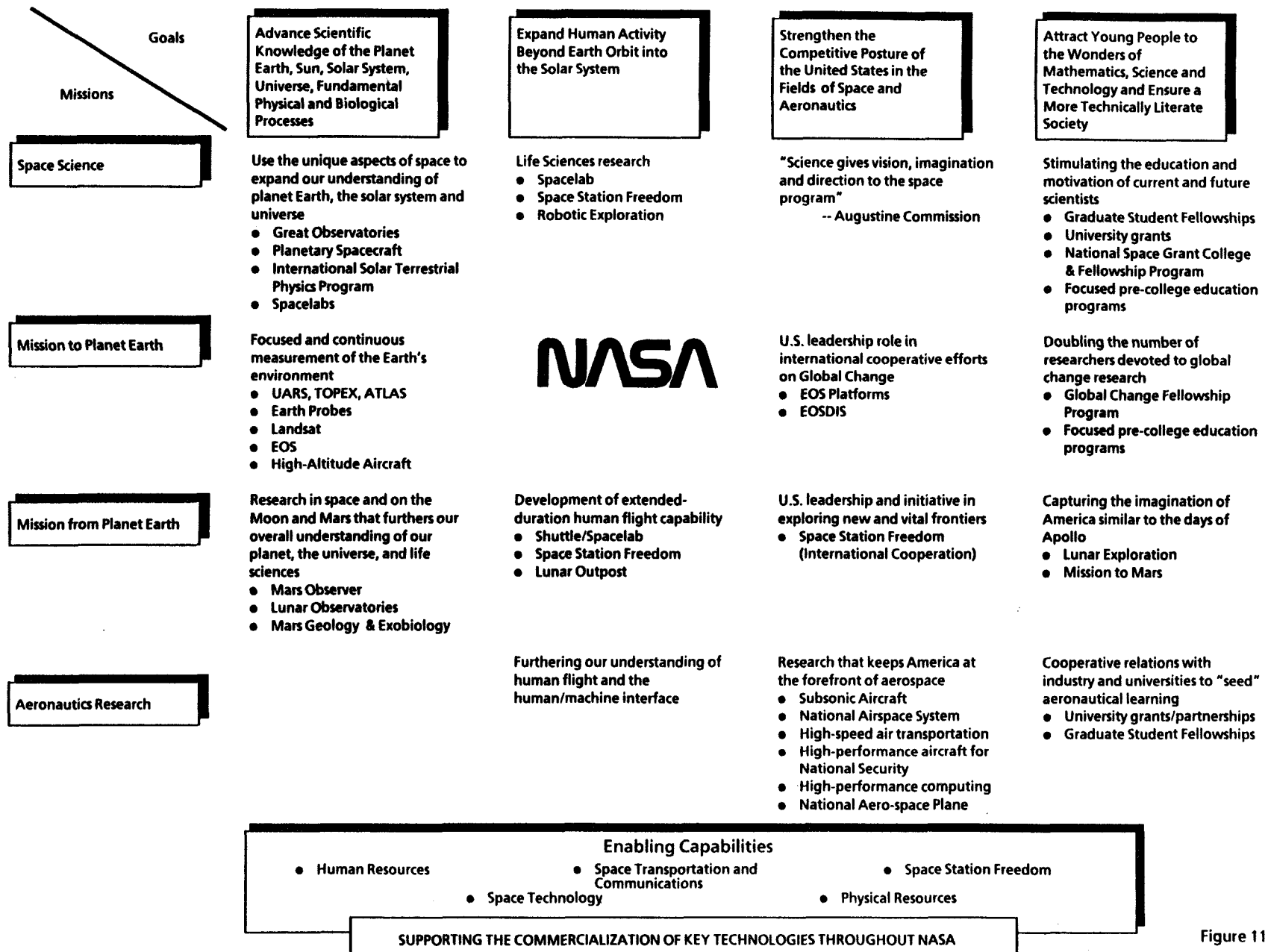


Figure 11